



Case Report

Diabetic artefacts in forensic practice

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ABSTRACT

A case is presented where confusion arose about skin lesions and whether they were diabetic or electrical in origin. The deceased was a known diabetic and hypertensive man.

A middle-aged person in early fifties was found unconscious in the cell and judicial autopsy was performed. He was facing trial for capital punishment of being allegedly involved in drug trafficking and money laundering. He had few marks over his fingers and foot which were considered to be electric marks produced in electric torture. Also had fracture of skull and ischemic necrosis of right side of cerebrum; and contrecoup lesions. Findings are documented with photographs of the lesions. The article also depicts photographs of the scene where the victim had fallen and sustained skull fracture.

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1. Introduction

We report a case in which there was a difficulty in interpreting the findings as whether it is due to artifact or electrocution as findings in our case which were due to skin complications of diabetes mellitus mimicked them very closely. The deceased was a known diabetic and hypertensive.

Micro-vascular disease is a major complication of diabetes mellitus. In the capillaries, the diabetic changes can be structural due to thickened wall or due to functional variation because of increased blood viscosity. Impaired blood flow due to increased viscosity results in dilated capillary loops, and results in periungal erythema. This erythema in nail bed is associated with dilation of the superficial vascular plexus. Periungal erythema is due to engorgement of the capillary loops. A spontaneous blister develops on the feet and legs. These lesions may rupture, develop an ulcer or become secondarily infected.

Artefact is any change produced in the body after death (accidental or physiologically unrelated finding to the natural state of the body), that is likely to lead to misinterpretation of medico-legally significant, ante mortem findings.¹

Changes are of a great variety and are because of different reasons. It may be bruising, swelling, occurrence of wound, bleeding, discoloration, blistering, fractures etc. Changes may occur in a variety of ways. In the deaths preceded by aggressive and invasive events, these changes may simulate pathological lesions, therefore they are very important to be identified. These changes are likely to

be misinterpreted and misunderstood by inexperienced and even by the experienced professional people like forensic pathologist or doctors.

Diabetes is a disease with significant micro-vascular and macro vascular manifestations, as evidenced by diabetic retinopathy, nephropathy, diabetic foot and skin manifestations. Artefactual misinterpretations (failure to differentiate the fact from the artefacts) are not uncommon in medico-legal practice.

Artefactual perception, mistake or an error, implies misinterpretation and misleading as a result of misunderstanding.

2. Case summary

The deceased was a middle-aged under trial and was lodged in state jail (Fig. 1). He was found unconscious on floor (Fig. 2) around mid-night by fellow jail inmates. He remained hospitalized for about two weeks in the hospital. During his hospital stay, he underwent craniotomy (Figs. 3–6) twice for drainage of blood which had collected due to stroke (Fig. 8) and head injury Figs. 5–7, 9.

He was a known diabetic and hypertensive man. He had fallen on the floor inside the room in prison and became unconscious. He was taken to prison hospital and from there immediately taken to district hospital. CT scan showed, fracture of skull bones (occipito-parietal and parietal bone extending from left to right), extradural haemorrhage, subdural Haemorrhage, cerebral oedema, brain infarction on right side.

3. External examination

The body was that of a well nourished, small sized, muscular adult Chinese male, 174 cm in height and 65 kg in weight. The

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Fig. 1. Solitary-confinement cell.



Fig. 2. Place of fall in the cell where he sustained fracture of skull in occipital area after stroke, CVA.



Fig. 3. Middle occipital areas showed abraded bruise near cut hair.



Fig. 4. Blood in occipital and temporo-parietal area of scalp, exaggerated by craniotomy wound.

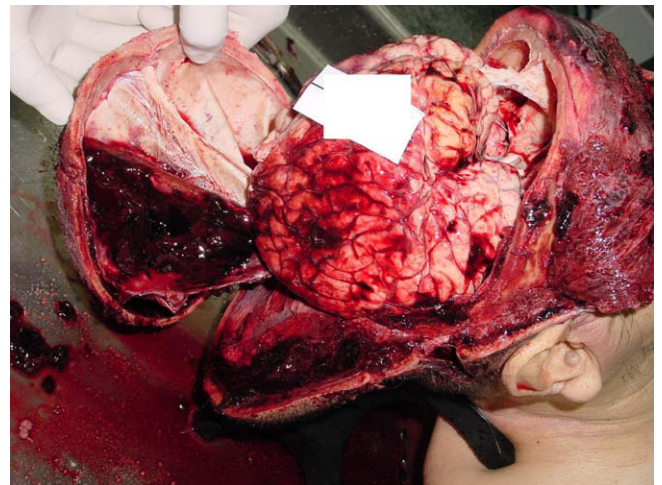


Fig. 5. Subdural and extradural haemorrhage with pressure caving in cerebrum.

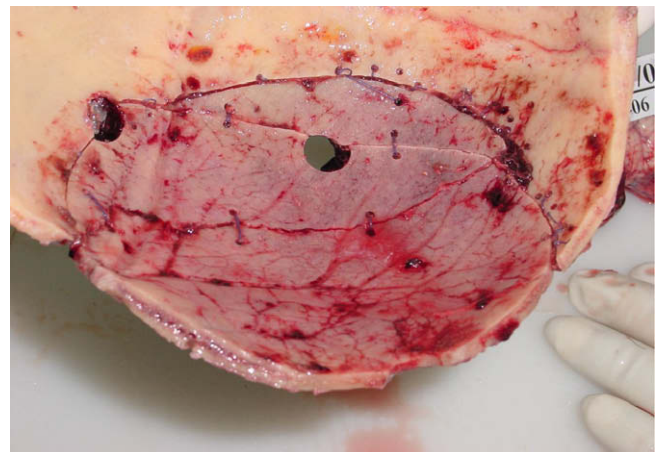


Fig. 6. Suturing of fracture line with craniotomy holes.

body was dressed in hospital cloths. Rigor mortis was fully established. Post-mortem hypostasis was present on the back aspect of the body. There were no features of decomposition noted.

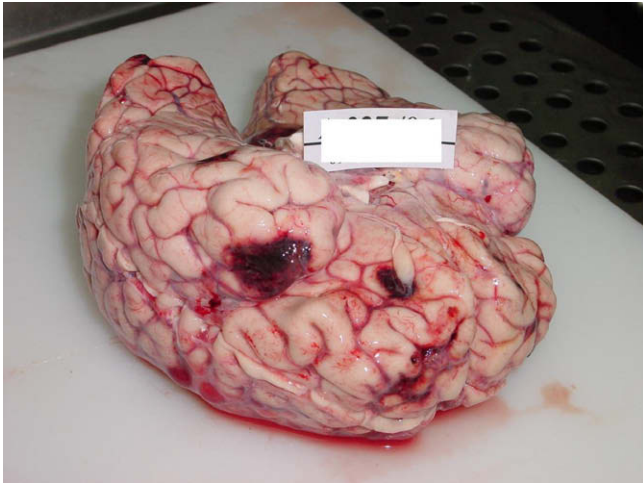


Fig. 7. Under surface of brain with contusion haemorrhages. Atherosclerosis of vessels also visible.

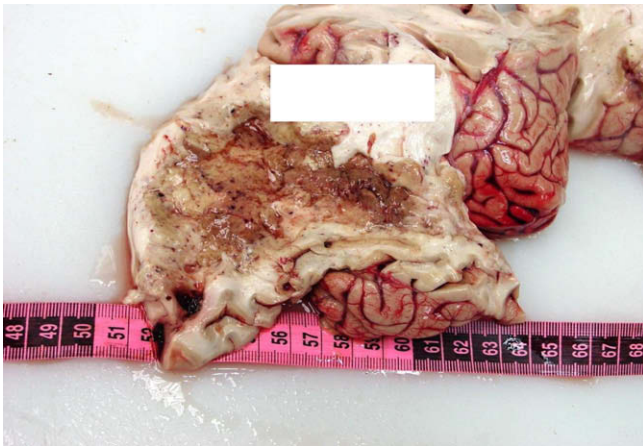


Fig. 8. Necrotic brain tissue after CVA.



Fig. 9. Patchy subarachnoid haemorrhage in the cerebellum.

Signs of recent medical therapy: surgical incision 23 cm in length seen over right side of his head (this incision was sutured and was due to brain surgery). There were punctured marks over right upper arm, in front of right elbow, right and left groin and left wrist. All these punctured marks were due to intra venous line.

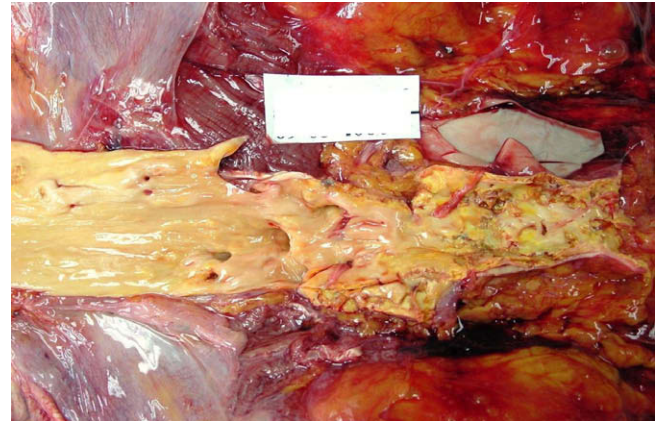


Fig. 10. Advance atherosclerosis in descending and abdominal aorta.



Fig. 11. Hand showing necrotic nail bed areas.



Fig. 12. Enlarged and close-view of above areas. Blackish discoloration of nail beds, right index finger with a large blackish-blue area; ring finger just showing early appearance of start of discolorations; ring finger showing eroded necrotic ulcerative lesion; little finger nail also showing small eroded ulcerative lesion.

Finger nail beds of right hand had blackish crescentic eroded areas (Figs. 11, 12). Toes had red colour blisters over sole side (Figs.



Fig. 13. Foot showing reddish areas (A and B).



Fig. 14. Shows early erythematous blister like appearances in toes except the great toe.



Fig. 15. Finger nail beds are clean without any ischemic effect.



Fig. 16. Foot of other side in clean.

4. Internal examination

4.1. Central nervous system

There was surgical incision on right parietal scalp with extravasation of blood (12 cm × 10 cm) (Figs. 3, 6). Two burr holes were present in the right parietal bone and diameter of this burr hole was 1 cm. There were three linear fractures on the right parietal bone. The length of these fractures was 13, 12, and 10 cm, respectively, and all three fractures were nearly parallel. All these three fractures had started from posterior part of parietal bone. There was 2 cm × 3 cm depressed fracture in the posterior part of right parietal bone and a linear fracture in the right temporal bone.

The brain (1370 g) showed moderate degree of cerebral oedema. There was 110 ml of extra dural blood collection in right parietal surface of brain. Cell necrosis around right basal ganglia. (Brain infarction) was seen. The ventricles were normal. The cerebellum and brain stem were normal. The cerebral vessels were intact and showed normal anatomy. The upper part of the spinal cord was unremarkable. The remainder of the spinal cord was not examined.

4.2. Cardiovascular system

The pericardium was intact and of unremarkable thickness. There was no unusual collection of fluid within the pericardial cav-

13a,b, and 14). Opposite hands and soles were normal (Figs. 15, 16).

ity. The great vessels arising from the heart showed normal anatomy. The heart (355 g) was of normal configuration and the chambers showed concordance. The size was normal for an individual of this size and age. The atria and ventricles were unremarkable. The epicardium and endocardium were unremarkable. The myocardium was unremarkable the right and left ventricular wall measured normal thickness. All coronary arteries were narrowed by 75% due atherosclerosis. There was moderate degree of atheroma in the aorta (Fig. 10).

4.3. Respiratory system

The soft tissues of the thoracic cage were intact. Ribs and sternum were normal. The pleural cavities were normal with smooth surfaces. The nasopharynx and the larynx with its surrounding structures were unremarkable. The trachea and bronchi were unremarkable. The lumen contained a small amount of mucus. The lungs (right 970 g, left 965 g) were congested and oedematous. The pleural surfaces were normal. Cut sections showed congestion and mild oedema. The pulmonary arteries were healthy.

4.4. Alimentary system

The peritoneal cavity was normal with no unusual effusion noted. The tongue and oropharynx was unremarkable. The oesophagus was normal and empty. The stomach contained a small amount of partially digested food material. No unusual smell noted in the gastric contents. The mucosa was normal. The external surfaces of the small and large bowel were unremarkable.

The liver (1610 g) was normal in size and light yellow in colour. Cut surfaces were normal. The gallbladder was unremarkable. Biliary tract was patent. The pancreas showed no evidence of recent or old inflammation and was unremarkable.

5. Histopathology report

Heart: section of heart showed hypertrophy of myofibrils of heart.

Kidney: section of kidney showed thickened media of small arteries, some glomeruli showed focal sclerosis.

Brain: section of cerebrum showed evidence of cerebral oedema and necrotic tissue and hypoxic changes of cerebella purkinje cells. In cerebrum there were features consistent with cerebral hypoxia.

Liver: liver sections showed cell necrosis around the central vein and liver sinusoid congestion.

Spleen: spleen section showed congestion.

Histology examination of the rest of tissue samples confirmed the macroscopic findings and did not reveal any additional pathology.

6. Opinion: death was due to cerebral hypoxia consequent to brain infarction and head injury

- (a) Cranio-cerebral injury
Due to
- (b) Fall from standing height
Due to
- (c) Brain infarction

7. Discussion

Diabetes is a disease with significant micro-vascular and macro vascular manifestations, as evidenced by diabetic retinopathy, nephropathy, diabetic foot and skin manifestations. During infec-

tion, the endogenous production of glucose is increased from the overall increased rate of catabolism. Hyperglycemia has been found to affect adherence, chemotaxis, and bactericidal activities of phagocytes. On other hand, hyperglycemia has been shown to have detrimental effects on cellular immunity. It also leads to growing of microorganisms in injured tissue. For this reason, diabetic are more prone to infections.

Poor glucose control correlated with the extent of disease and poor outcome, suggesting that hyperglycemia contributed significantly to the pathogenesis and out come of NF.

Several studies have cited infection as an important cause of morbidity in diabetic patients. One of the most important infections is necrotizing fascitis in diabetic patients. Gram-negative bacilli and gram-positive cocci have been identified in the majority of patients. Fungal infections may be found, but are rare.

Necrotizing skin and soft tissue infections with necrosis process of skin, with underneath infections is serious condition can be seen in toxic-like state, multi organ failure and delayed cutaneous necrosis? The organisms responsible for the disease are Group A *Streptococci*, *Staphylococcus aureus*, *Staphylococcus epidermidis* and *Clostridium* species; the gram-negative organisms; *Escherichia coli*, *Enterobacter*, *Pseudomonas* species, *Proteus* species, *Serratia* species and *Bacteriodes* an even fungi such *Mucor* and *Zygomycetes*.^{1,2}

Level walking, ascending heights, mountain climbing, climbing stair, rising from sitting position form chair has results in higher peak pressure of toes and soles. An important pressure receptive area is a big toe region. It has a lower pressure during stairs climbing. In all the activities and in the plantar regions, peak pressure was found to be lower for patients with neuropathy than patients without neuropathy.³

In our study the lesions seen in the finger beds and soles could be due to diabetes in this deceased. But main concern is as how to deny allegations in this case of whether he was tortured electrically in the prison as lesions are closely simulating the finer electric points which are seen in the victims tortured in the jail. In this particular case skin lesions were not seen when he was admitted in the hospital. He remained in coma for few days and after that he developed chest infection. The lesions were noticed only just two day prior to his death while being operated for firearm head injury.

His autopsy report mentioned that he was a case of accidental fall after stroke from a standing height in the solitary confinement prison cell. Crime scene examination, spot and testimony of other staff and prisoners was also consistent with it. It was hypothesized that the lesions over the skin of hand and feet were probably due ischemic effects because of poor neuro-muscular and vascular control as a result of cerebral ischemia.

The other lesions which may pose problems in such cases in interpretation of findings are pigmented purpura which resembles cigarette burns.

If the clinical correlation is not done in such cases a trained person also can easily make mistake in the actual diagnosis. In this case, only after all the factors are correlated together it can be stated that due to skull fracture after sudden fall as a result of stroke after which patient condition deteriorated and he went into deep coma and multi organ failure. The lesions over the finger beds and soles were probably due to skin complications of diabetes (Figs. 11–16). This case has shown importance of the patho-clinical knowledge and that the clinical correlation is must while interpreting forensic trauma, as ignorance at times can waste the time of investigating agencies.

Erroneous attribution of certain artifacts as may lead to unfortunate consequences. This case report emphasizes the need to be familiar with some such artifacts and recognize them as such. Our case report describe and provide pictorial examples of

conditions that reflect underlying disease related lesions causing a confusion of it to be an artifacts and also it was difficult to deny allegations whether the case reported was tortured electrically in the prison.

Conflict of interest statement

There is no conflict to declare. No financial was taken from any source.

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Ethical approval

No ethical approval is needed.

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